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DEVICE FOR CONTACTING SHEETS CARRYING SENSITIVE LAYERS WITH AT LEAST TWO LIQUIDS

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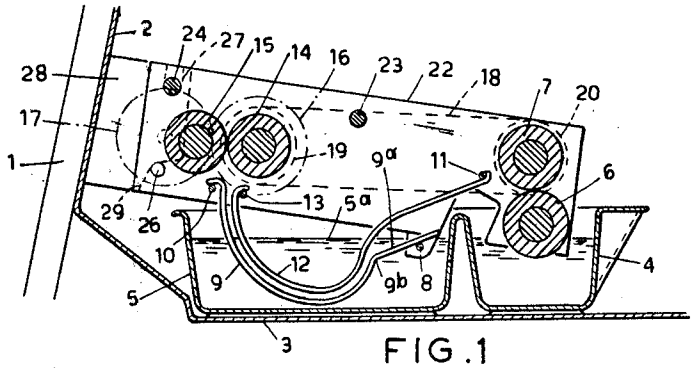


FIG. 1

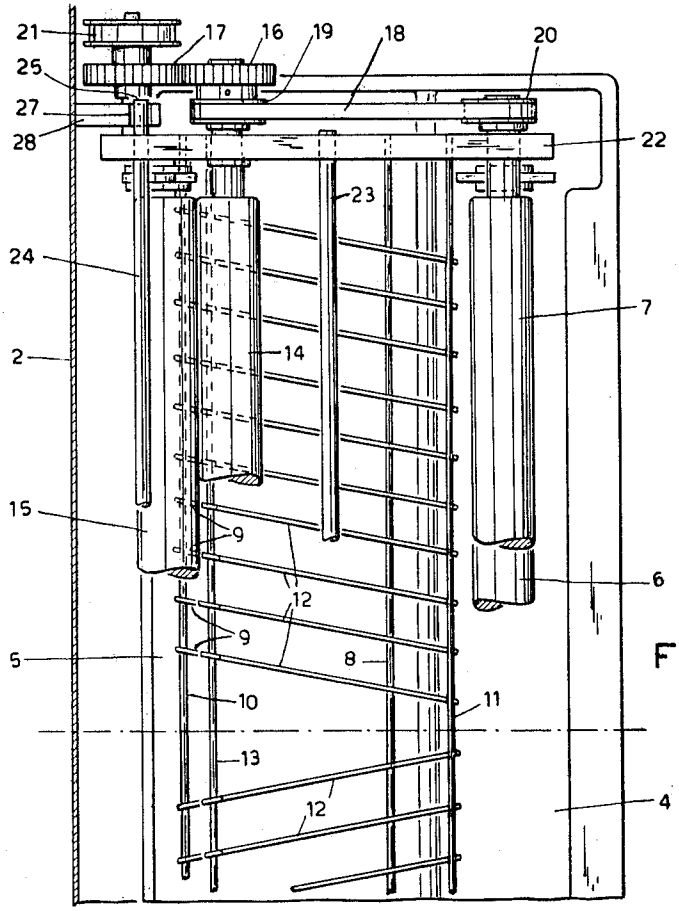


FIG. 2

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DEVICE FOR CONTACTING SHEETS CARRYING SENSITIVE LAYERS WITH AT LEAST TWO LIQUIDS

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This invention relates to a device for contacting sheets carrying sensitive layers with at least two liquids, for example a developing liquid and a stabilizing liquid.

In such devices it is essential that the time of contact of any part of the sheets with each liquid is substantially equal to the time of contact of any other part in order to prevent the formation of dark spots or bands on the sheets due to different developing and stabilizing conditions.

It is an object of this invention to provide a device of the type referred to wherein objectionable results due to liquid carried along by the sheets from the reservoir containing the first liquid and collecting in the form of drops on parts in the path of the sheets are substantially eliminated.

According to this invention the device comprises a frame, a first container for the first liquid, a second container for the second liquid, a pair of cooperating rolls mounted in said frame for introducing sheets to be contacted with said liquids into the device, the lower one of said pair of rolls being in part immersed in said first liquid for moistening the lower side of the sheets passing between said pair of rolls, and upper and lower guiding means defining a narrow passage for guiding the sheets through said second liquid and thereout in an upward direction, said lower guiding means comprising a plurality of sheet supporting elements substantially extending in the direction of movement of the sheets, said upper and lower guiding means being shaped so as to have the inlet end of said narrow passage below the level of said second liquid and to cause the portion of a sheet being in said narrow passage to keep the further portion supplied by said pair of rolls clear of any part of said lower guiding means positioned above the level of said second liquid.

Due to this arrangement the sheets supplied by said pair of rolls are in guiding contact only with the upper guiding means in being directed to the narrow passage defined by the upper and lower guiding means so that the lower side of the sheets moistened with the first treating liquid does not contact the lower guiding means before it is below the level of the second liquid. Consequently, deposition of liquid drops or crust formation on any part of the lower guiding means positioned above the level of the second liquid is prevented whereby band formation on the sheets is substantially completely eliminated.

The sheets supporting elements of the lower guiding means may be ribs formed on a plate-like member having perforations for promoting the liquid circulation but preferably are constituted by wires or bars extending between connecting members mounted in the frame of the device.

The lower guiding means may have its leading edge below the level of the second liquid but preferably is provided with a portion defining together with the upper guiding means a broad inlet leading to the narrow passage, said portion merging with a sharp bend into the portion constituting the lower boundary of the narrow passage. Such broad inlet ensures that the sheets are guided into the narrow passage in the correct way even if their leading edges are curled. In case thereby drops of the first treating liquid should be deposited onto the first portion of the lower guiding means they can not interfere with

the development and stabilization of the further sheet portion and of next sheets since these move in a free arc over the contaminated first portion of the lower guiding means.

For illustrating the invention, an embodiment thereof is shown in the drawing, in which:

FIG. 1 is a cross-sectional elevation of this embodiment in the direction of movement of the sheets to be contacted with the liquids, and

FIG. 2 is a plan view of the device shown in part only.

In the embodiment shown, the device is adapted for contacting sheets with a developing and a stabilizing liquid and forms part of a larger unit comprising an exposure compartment, of which one wall 1 is shown only. The bottom portion 3 of a plate 2, 3 secured to wall 1 carries two reservoirs 4 and 5 forming a unit and containing the treating liquids.

The lower roll 6 of a first pair of rolls 6, 7 is immersed in part in the developing liquid contained in the reservoir 4 and thereby moistens the lower side of the sheets introduced into the device; accordingly, the layer to be developed should be at the lower side of the sheets.

The sheets supplied and moistened by the rolls 6, 7 are guided by guiding means 8—10 and 11—13 through the treating liquid contained in reservoir 5 and thereout to a pair of discharge rolls 14, 15. The lower guiding means comprises a plurality of wires 9 secured with one end to a supporting wire 8 and with the other end to a supporting wire 10. As appears from FIG. 2, the wires 9 are divided into two groups of parallel wires, the respective directions of which diverge in the direction of movement of the sheets to be developed. This prevents the longitudinal edges of the sheets from being jammed against the wires. The upper guiding means also comprises wires 12 secured to supporting wires 11, 13 and divided into two diverging groups too.

The leading edge of a sheet supplied by the rolls 6, 7 and moistened with developing liquid will contact the wires 12 of the upper guiding means 11, 12, 13 and will be guided thereby in a downward direction into the narrow passage defined between the upper and lower guiding means. Normally, the sheet will contact the wires 9 of the lower guiding means not before the bends 9*b* positioned below the level 5*a* of the second treating liquid. In moving along the further portion of the sheet will be kept free of the portion 9*a* of the wires and also of the separating wall between the reservoirs 4 and 5 so that the deposition of any developing liquid on the lower side of the sheet is prevented. Stabilizing liquid which possibly creeps upwards from reservoir 5 along the wires 9 can not reach the lower side of the sheet either. Due to the curvature of the wires 12 and 9 of the guiding means at the beginning of the narrow passage beyond bend 9*b* the last portion of the sheet, after being released by the rolls 6, 7, is also kept free of the wire portions 9*a* and the separating wall so that even thereon no discoloured bands are formed. Each portion of the sheet follows a substantially identical path whereby variations in blackening due to small variations in the time of treatment with the developing or the stabilizing liquid are avoided.

The rolls 6 and 15 are pressed against the cooperating rolls by resilient means (not shown). The axle of roll 14 carries a gear 16 engaging a gear 17 driven by a motor (not shown). The roll 7 is driven by means of a belt 18 arranged on pulleys 19 and 20 fixed on the axles of the rolls 14 and 7, respectively. The axle of gear 17 carries a pulley 21 to be driven by a motor driven belt.

The rolls 6, 7, 14, 15 with their driving means and the guiding means 8—10 and 11—13 are mounted in side plates 22 secured to each other by means of bars 23 and 24 snugly fitted in openings made in the plates. Bar 24 projects at both sides from the side plates 22.

Below the pin-like ends 25 of bar 24 transverse pins 26 are arranged in the side plates. (The drawing shows one of the side plates 22, of the ends 25 and of the pins 26 only.) In operation the pin-like ends 25 are supported in substantially vertical recesses 27 made in supporting members 28 secured to wall 1. The transverse pins 26 are then located in substantially horizontal recesses 29 of the supporting members 28 and limit the swinging movement the unit comprising the side plates 22 with the parts mounted therein can make about the pin-like ends 25 in the recesses 27. This manner of supporting permits the unit to be taken away and to be inserted very easily. Moreover, the unit is prevented from moving upwards when the user pulls the sheets discharged by the rolls 14, 15 in an upward direction.

The motor driven gear 17 is journalled in one of the supporting members 28 such that it engages gear 16 if the transverse pins 26 abut against the end wall of the recesses 29.

What I claim is:

1. In a device for contacting sheets having a sensitive layer with at least two liquids and including two containers for said liquids, a frame, a moistening roll mounted in said frame and adapted to be partially immersed in a moistening liquid when contained in one of said containers for moistening the sensitive layer of a sheet passed over said roll, upper and lower guiding means for said sheets arranged in said frame and defining a passageway therebetween dipping downwardly, passing through and rising out of an impregnating liquid contained in the other of said containers, and means for transporting said sheets through the device by passing said sheets over said moistening roll and through said passageway, the improvements comprising, said upper guiding means including a leading edge positioned over said first container near said moistening roll to engage the upper sides of sheets passing thereover, a substantially straight portion extending from the leading edge downwardly into impregnating liquid in said second container and a curved portion bent downwardly and then upwardly to emerge above said impregnating liquid, said lower guiding means having straight and curved portions similar to those of the upper guiding means, the curved portion of the lower guiding means being spaced a small distance from the

curved portion of the upper guiding means to define said narrow passageway, the straight portion of said lower guiding means being substantially shorter than that of the upper guiding means and having a leading edge positioned near the surface of the impregnating liquid in said second container, the straight portion of the upper guiding means being inclined upwardly and away from the straight portion of the lower guiding means to form a mouth communicating with the said narrow passageway, said mouth being of greater height at its entrance than at its exit connected to the narrow passageway, and said mouth being totally unobstructed to receive the leading edge of a sheet from the moistening roll against the upper guiding means only whereby to keep the sensitive underside of said sheet in its path from said moistening roll to the surface of said impregnating liquid clear of any part of the device.

2. A device according to claim 1 wherein said lower guiding means comprises a plurality of sheet supporting wire elements substantially extending in the direction of movement of the sheets and secured to supporting wires at both ends.

3. A device as defined in claim 1 wherein said frame comprises two side plates, each having two projecting pin-like members arranged substantially one above the other, the device further comprising two fixed supporting members, each having a substantially vertical recess and a substantially horizontal recess positioned substantially below said vertical recess, said recesses being adapted to removably receive said pin-like members carried by said side plates.

4. A device as claimed in claim 3 further comprising a gear journalled in one of said fixed supporting members, means capable of being driven mounted on the axle of said gear, and a second gear journalled in said frame in driving relationship with at least one of said pair of rolls, the arrangement of said gears being such that they are in engagement when said frame is supported by said fixed supporting members in its operating position.

References Cited in the file of this patent

FOREIGN PATENTS

1,095,416 France ---------- Dec. 22, 1954